

# Work Order ID 137014

**\*137014\***

Page 1

Wednesday, September 23, 2015 10:25:27 A

Item ID: D407-667-205TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 9/23/2015 Start Qty: 1.00 **\*1\***

Cust Item ID:

Required Date: 9/23/2015 Req'd Qty: 1.00 **\*1\***

Customer:

Reference:

Approvals: Process Plan: MCS Date: SEP 23 2015 Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| Draw Nbr                       | Revision Nbr             |                      |         |        |              |               |               |                  |                |
| D407-667-245                   | Rev G                    |                      |         |        |              |               |               |                  |                |

100

0.00

**\*100\***

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.02

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8531 on both ends as per Folio FA248

2-Turn first side as per Folio FA248

3-Blend transition lines only, \*\*do not sand whole tube\*\*:

FOLIO REV: AA

DWG REV: 6

\*Use mill bastard file, brush file repeatedly with file card.

\*\*Do not use sandpaper coarser than 320 grit.

1 Ø  
mm  
16/02/01

110

QC1- Inspection performed by CMM

0.00

**\*110\***

QC

Memo

0.00

Quality Control

QC2  
8/16/15

1 Ø  
mm  
16/02/02

# Work Order ID 137014

**\*137014\***

Page 2

Wednesday, September 23, 2015 10:25:27 A

Item ID: D407-667-205TRN Accept **\*N900040100\*** Setup Start **\*NS1\***  
Revision ID: Stop **\*NS2\***  
Item Name: Crosstube Turning Detail  
Start Date: 9/23/2015 Start Qty: 1.00 **\*1\*** Cust Item ID:  
Required Date: 9/23/2015 Req'd Qty: 1.00 **\*1\*** Customer:  
Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

120

**\*120\***

Mori Seiki

Mori Seiki CNC Lathe Large

MORI SEIKI CNC LATHE LARGE

Memo

1-Turn second side as per Folio FA248

2-Blend transition lines only, \*\*do not sand whole tube\*\*:

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

FOLIO REV: NA

DWG REV: 6

3-Remove sand and plugs

4-Scribe part # and batch # using vibrating stylus as per Dwg D407-667-245

0.00

0.05

130

**\*130\***

QC

Quality Control

~~QC1~~ Inspection performed by CMM

QC2

8/16/15

Memo

0.00

0.00

1  $\phi$

1  $\phi$

mm L  
16/02/03

mm L  
16/02/03

DQA:

Date: 16.03.01



## WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed

Date: 16/02/17

Work Order update only ☐

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                                                                                                                                                                                                            |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Work Order: <u>137014</u><br>Part No: <u>D407-667-205TRN</u><br>NCR No: <u>16 3597</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <b>DISPOSITION</b><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input checked="" type="checkbox"/><br>Suspected Unapproved <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><div style="display: flex; justify-content: space-between;"> <div>           Skid-tube <input type="checkbox"/><br/>           Machining <input type="checkbox"/><br/>           Thermoforming <input type="checkbox"/><br/>           Large Fab <input type="checkbox"/> </div> <div>           Cross tube <input checked="" type="checkbox"/><br/>           Small Fab <input type="checkbox"/><br/>           Finishing <input type="checkbox"/><br/>           Composite <input type="checkbox"/> </div> <div>           Water Jet <input type="checkbox"/><br/>           Prod. Eng. Coord. <input type="checkbox"/><br/>           Rec/Store/Packaging <input type="checkbox"/><br/>           Supplier <input type="checkbox"/> </div> <div>           Engineering <input type="checkbox"/><br/>           Quality <input type="checkbox"/><br/>           Other <input type="checkbox"/> </div> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |                                                                                                                                                                                                            |  |
| Date: <u>16/2/8</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Step #: <u>100</u>                                                                                                                                                                        | QTY Effective: <u>1</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  | MRB (QSI042) Approval<br>DAS<br>12<br>9-89 <u>16/2/8</u>                                                                                                                                                   |  |
| Description Work Order Deviation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                           | Disposition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | Completed By<br>DAS<br>12<br>9-89 <u>16/2/8</u><br>Lead hand / Supervisor<br>Approval Verification<br>DAS<br>47<br>9-89 <u>16-02-10</u><br>QC / QA Coordinator<br>Approval<br><u>98</u><br><u>16-02-10</u> |  |
| Well thickness measurement is over tolerance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                           | Acceptable. Minum well is within eccentricity allowable of new material                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |                                                                                                                                                                                                            |  |
| <b>Root Cause</b><br><div style="display: flex;"> <div style="flex: 1;">           Environment <input type="checkbox"/><br/>           Design <input type="checkbox"/><br/>           Doc/Data <input type="checkbox"/><br/>           Equip/Tooling <input type="checkbox"/><br/>           Handling/Pre <input type="checkbox"/><br/>           Material <input checked="" type="checkbox"/><br/>           Internal Transport <input type="checkbox"/><br/>           Tribal Knowledge <input type="checkbox"/><br/>           LOA <input type="checkbox"/><br/>           Substation <input type="checkbox"/><br/>           Past Expiry Date <input type="checkbox"/><br/>           Misidentified <input type="checkbox"/> </div> <div style="flex: 1;">           No Re-verification <input type="checkbox"/><br/>           Operator <input type="checkbox"/><br/>           Offset/Setup <input type="checkbox"/><br/>           Supplier <input type="checkbox"/><br/>           Training <input type="checkbox"/><br/>           Use for Testing <input type="checkbox"/><br/>           Poor Information <input type="checkbox"/><br/>           Rushing <input type="checkbox"/><br/>           Product Improvement <input type="checkbox"/><br/>           Process Improvement <input type="checkbox"/><br/>           Manufacturing Process <input type="checkbox"/><br/>           Past Due <input type="checkbox"/> </div> </div> |                                                                                                                                                                                           | <b>FAULT CATEGORY</b><br><div style="display: flex;"> <div style="flex: 1;">           Pressure/Forced <input type="checkbox"/><br/>           Bending <input type="checkbox"/><br/>           Centre Not Concentric <input type="checkbox"/><br/>           Cracks <input type="checkbox"/><br/>           Crimp/Kink/Ripple/Wave <input type="checkbox"/><br/>           Cuffs <input type="checkbox"/><br/>           Crushing <input type="checkbox"/><br/>           Heat Treat <input type="checkbox"/><br/>           Wave/Twist in Tube <input type="checkbox"/><br/>           Marks/Chatter <input type="checkbox"/> </div> <div style="flex: 1;">           Temperature/Cure <input type="checkbox"/><br/>           Set-up <input type="checkbox"/><br/>           BOM/Route <input type="checkbox"/><br/>           Broken/Damage/Defect <input type="checkbox"/><br/>           Inspection Incomplete/Unqualified <input type="checkbox"/><br/>           Contamination <input type="checkbox"/><br/>           Countersink <input type="checkbox"/><br/>           Cut Too Short <input type="checkbox"/><br/>           Instructions Incomplete/Unclear <input type="checkbox"/><br/>           Drill Holes <input type="checkbox"/> </div> <div style="flex: 1;">           Power Loss/Surge <input type="checkbox"/><br/>           Folio/Program <input type="checkbox"/><br/>           Grain <input type="checkbox"/><br/>           Weld <input type="checkbox"/><br/>           Wrong Stock Pulled <input type="checkbox"/><br/>           Out of Sequence <input type="checkbox"/><br/>           Off-set <input type="checkbox"/><br/>           Mislabelled <input type="checkbox"/><br/>           Fit/Function <input type="checkbox"/><br/>           Misaligned/off center <input type="checkbox"/> </div> <div style="flex: 1;">           Positioned Wrong <input type="checkbox"/><br/>           Outside Dimensions <input type="checkbox"/><br/> <input checked="" type="checkbox"/> Over/Under tolerance<br/>           Part Incorrect <input type="checkbox"/><br/>           Part Lost/Missing <input type="checkbox"/><br/>           Part Moved <input type="checkbox"/><br/>           Drawing <input type="checkbox"/><br/>           Finish <input type="checkbox"/><br/>           Misread <input type="checkbox"/><br/>           Turning Sequence <input type="checkbox"/> </div> </div> |  |                                                                                                                                                                                                            |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                           | OTHER: <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |                                                                                                                                                                                                            |  |

# Work Order ID 137014

**\*137014\***

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Wednesday, September 23, 2015 10:25:27 A

Item ID: D407-667-205TRN Accept **\*N900040100\*** Setup Start **\*NS1\***  
Revision ID: Stop **\*NS2\***  
Item Name: Crosstube Turning Detail  
Start Date: 9/23/2015 Start Qty: 1.00 **\*1\*** Cust Item ID:  
Required Date: 9/23/2015 Req'd Qty: 1.00 **\*1\*** Customer:  
Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description                                             | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|----------------------------------------------------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 140                            | QC8- Inspect parts - second check                                    | 0.00                 |         |        |              | 1             | 0             |                  | 47<br>9-89     |
| <b>*140*</b>                   |                                                                      |                      |         |        |              |               |               |                  |                |
| QC                             | Memo                                                                 | 0.00                 |         |        |              |               |               |                  |                |
| Quality Control                |                                                                      |                      |         |        |              |               |               |                  | 16-02-10       |
| 145                            |                                                                      | 0.00                 |         |        |              |               |               |                  |                |
| <b>*145*</b>                   |                                                                      |                      |         |        |              |               |               |                  |                |
| Crosstubes                     | Memo                                                                 | 0.01                 |         |        |              |               |               |                  | 16-02-10       |
| Crosstubes                     | Grind off circumferential machining marks longitudinally.            |                      |         |        |              |               |               |                  |                |
| 150                            |                                                                      | 0.00                 |         |        |              |               |               |                  |                |
| <b>*150*</b>                   |                                                                      |                      |         |        |              |               |               |                  |                |
| HandFXtube                     | Memo                                                                 | 0.01                 |         |        |              |               |               |                  | 16-02-12       |
| Hand Finishing Crosstubes      | 1- PRESSURE WASH X-TUBE INSIDE AND OUT                               |                      |         |        |              |               |               |                  |                |
|                                | 2- ALODINE AND ACID ETCH X-TUBE INSIDE AND OUT. USE RED SCOTCH BRITE |                      |         |        |              |               |               |                  |                |

DQA: \_\_\_\_\_ Date: \_\_\_\_\_



## WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Work Order update only ☐

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Suspected Unapproved <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                      | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><div style="display: flex; justify-content: space-between;"> <div>             Skid-tube <input type="checkbox"/><br/>             Machining <input type="checkbox"/><br/>             Thermoforming <input type="checkbox"/><br/>             Large Fab <input type="checkbox"/> </div> <div>             Cross tube <input type="checkbox"/><br/>             Small Fab <input type="checkbox"/><br/>             Finishing <input type="checkbox"/><br/>             Composite <input type="checkbox"/> </div> <div>             Water Jet <input type="checkbox"/><br/>             Prod. Eng. Coord. <input type="checkbox"/><br/>             Rec/Store/Packaging <input type="checkbox"/><br/>             Supplier <input type="checkbox"/> </div> <div>             Engineering <input type="checkbox"/><br/>             Quality <input type="checkbox"/><br/>             Other <input type="checkbox"/> </div> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Date :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Step #:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | QTY Effective :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | MRB (QSI042) Approval                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Description Work Order Deviation                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Disposition                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Completed By                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Lead hand / Supervisor<br>Approval Verification                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | QC / QA Coordinator<br>Approval                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Root Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | FAULT CATEGORY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Environment <input type="checkbox"/><br>Design <input type="checkbox"/><br>Doc/Data <input type="checkbox"/><br>Equip/Tooling <input type="checkbox"/><br>Handling/Pre <input type="checkbox"/><br>Material <input type="checkbox"/><br>Internal Transport <input type="checkbox"/><br>Tribal Knowledge <input type="checkbox"/><br>LOA <input type="checkbox"/><br>Substation <input type="checkbox"/><br>Past Expiry Date <input type="checkbox"/><br>Misidentified <input type="checkbox"/> | No Re-verification <input type="checkbox"/><br>Operator <input type="checkbox"/><br>Offset/Setup <input type="checkbox"/><br>Supplier <input type="checkbox"/><br>Training <input type="checkbox"/><br>Use for Testing <input type="checkbox"/><br>Poor Information <input type="checkbox"/><br>Rushing <input type="checkbox"/><br>Product Improvement <input type="checkbox"/><br>Process Improvement <input type="checkbox"/><br>Manufacturing Process <input type="checkbox"/><br>Past Due <input type="checkbox"/> | Pressure/Forced <input type="checkbox"/><br>Bending <input type="checkbox"/><br>Centre Not Concentric <input type="checkbox"/><br>Cracks <input type="checkbox"/><br>Crimp/Kink/Ripple/Wave <input type="checkbox"/><br>Cuffs <input type="checkbox"/><br>Crushing <input type="checkbox"/><br>Heat Treat <input type="checkbox"/><br>Wave/Twist in Tube <input type="checkbox"/><br>Marks/Chatter <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Temperature/Cure <input type="checkbox"/><br>Set-up <input type="checkbox"/><br>BOM/Route <input type="checkbox"/><br>Broken/Damage/Defect <input type="checkbox"/><br>Inspection Incomplete/Unqualified <input type="checkbox"/><br>Contamination <input type="checkbox"/><br>Countersink <input type="checkbox"/><br>Cut Too Short <input type="checkbox"/><br>Instructions Incomplete/Unclear <input type="checkbox"/><br>Drill Holes <input type="checkbox"/> | Power Loss/Surge <input type="checkbox"/><br>Folio/Program <input type="checkbox"/><br>Grain <input type="checkbox"/><br>Weld <input type="checkbox"/><br>Wrong Stock Pulled <input type="checkbox"/><br>Out of Sequence <input type="checkbox"/><br>Off-set <input type="checkbox"/><br>Misabeled <input type="checkbox"/><br>Fit/Function <input type="checkbox"/><br>Misaligned/off center <input type="checkbox"/> | Positioned Wrong <input type="checkbox"/><br>Outside Dimensions <input type="checkbox"/><br>Over/Under tolerance <input type="checkbox"/><br>Part Incorrect <input type="checkbox"/><br>Part Lost/Missing <input type="checkbox"/><br>Part Moved <input type="checkbox"/><br>Drawing <input type="checkbox"/><br>Finish <input type="checkbox"/><br>Misread <input type="checkbox"/><br>Turning Sequence <input type="checkbox"/> |
| OTHER :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                   |

# Work Order ID 137014

Wednesday, September 23, 2015 10:25:27 A

**\*137014\***

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Item ID: D407-667-205TRN Accept **\*N900040100\*** Setup Start **\*NS1\***  
Revision ID: Stop **\*NS2\***  
Item Name: Crosstube Turning Detail  
Start Date: 9/23/2015 Start Qty: 1.00 **\*1\*** Cust Item ID:  
Required Date: 9/23/2015 Req'd Qty: 1.00 **\*1\*** Customer:  
Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_ Run Start **\*NR1\***  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_ Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description                                | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|---------------------------------------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 160                            | QC7-Inspect Chemical Conversion Coat                    | 0.00                 |         |        |              |               |               |                  |                |
| <b>*160*</b>                   |                                                         |                      |         |        |              |               |               |                  |                |
| QC                             | Memo                                                    | 0.00                 |         |        |              |               |               |                  |                |
| Quality Control                |                                                         |                      |         |        |              |               |               |                  |                |
| 170                            | Packaging                                               | 0.00                 |         |        |              |               |               |                  |                |
| <b>*170*</b>                   |                                                         |                      |         |        |              |               |               |                  |                |
| Packaging                      | Memo                                                    | 0.00                 |         |        |              |               |               |                  |                |
| Packaging                      | Identify and stock in kanban rackLocation: <u>LG014</u> |                      |         |        |              |               |               |                  |                |
| 180                            | QC21- Final Inspection - Work Order Release             | 0.00                 |         |        |              |               |               |                  |                |
| <b>*180*</b>                   |                                                         |                      |         |        |              |               |               |                  |                |
| QC                             | Memo                                                    | 0.00                 |         |        |              |               |               |                  |                |
| Quality Control                |                                                         |                      |         |        |              |               |               |                  |                |

*SA 20160216*

DQA: \_\_\_\_\_ Date: \_\_\_\_\_



## WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Work Order update only ☐

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| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Suspected Unapproved <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                      | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><div style="display: flex; justify-content: space-between;"> <div>             Skid-tube <input type="checkbox"/><br/>             Machining <input type="checkbox"/><br/>             Thermoforming <input type="checkbox"/><br/>             Large Fab <input type="checkbox"/> </div> <div>             Cross tube <input type="checkbox"/><br/>             Small Fab <input type="checkbox"/><br/>             Finishing <input type="checkbox"/><br/>             Composite <input type="checkbox"/> </div> <div>             Water Jet <input type="checkbox"/><br/>             Prod. Eng. Coord. <input type="checkbox"/><br/>             Rec/Store/Packaging <input type="checkbox"/><br/>             Supplier <input type="checkbox"/> </div> <div>             Engineering <input type="checkbox"/><br/>             Quality <input type="checkbox"/><br/>             Other <input type="checkbox"/> </div> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Date :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Step #:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | QTY Effective :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | MRB (QSI042) Approval                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Description Work Order Deviation                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Disposition                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| Root Cause                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | FAULT CATEGORY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Environment <input type="checkbox"/><br>Design <input type="checkbox"/><br>Doc/Data <input type="checkbox"/><br>Equip/Tooling <input type="checkbox"/><br>Handling/Pre <input type="checkbox"/><br>Material <input type="checkbox"/><br>Internal Transport <input type="checkbox"/><br>Tribal Knowledge <input type="checkbox"/><br>LOA <input type="checkbox"/><br>Substation <input type="checkbox"/><br>Past Expiry Date <input type="checkbox"/><br>Misidentified <input type="checkbox"/> | No Re-verification <input type="checkbox"/><br>Operator <input type="checkbox"/><br>Offset/Setup <input type="checkbox"/><br>Supplier <input type="checkbox"/><br>Training <input type="checkbox"/><br>Use for Testing <input type="checkbox"/><br>Poor Information <input type="checkbox"/><br>Rushing <input type="checkbox"/><br>Product Improvement <input type="checkbox"/><br>Process Improvement <input type="checkbox"/><br>Manufacturing Process <input type="checkbox"/><br>Past Due <input type="checkbox"/> | Pressure/Forced <input type="checkbox"/><br>Bending <input type="checkbox"/><br>Centre Not Concentric <input type="checkbox"/><br>Cracks <input type="checkbox"/><br>Crimp/Kink/Ripple/Wave <input type="checkbox"/><br>Cuffs <input type="checkbox"/><br>Crushing <input type="checkbox"/><br>Heat Treat <input type="checkbox"/><br>Wave/Twist in Tube <input type="checkbox"/><br>Marks/Chatter <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Temperature/Cure <input type="checkbox"/><br>Set-up <input type="checkbox"/><br>BOM/Route <input type="checkbox"/><br>Broken/Damage/Defect <input type="checkbox"/><br>Inspection Incomplete/Unqualified <input type="checkbox"/><br>Contamination <input type="checkbox"/><br>Countersink <input type="checkbox"/><br>Cut Too Short <input type="checkbox"/><br>Instructions Incomplete/Unclear <input type="checkbox"/><br>Drill Holes <input type="checkbox"/> | Power Loss/Surge <input type="checkbox"/><br>Folio/Program <input type="checkbox"/><br>Grain <input type="checkbox"/><br>Weld <input type="checkbox"/><br>Wrong Stock Pulled <input type="checkbox"/><br>Out of Sequence <input type="checkbox"/><br>Off-set <input type="checkbox"/><br>Mislabeled <input type="checkbox"/><br>Fit/Function <input type="checkbox"/><br>Misaligned/off center <input type="checkbox"/> | Positioned Wrong <input type="checkbox"/><br>Outside Dimensions <input type="checkbox"/><br>Over/Under tolerance <input type="checkbox"/><br>Part Incorrect <input type="checkbox"/><br>Part Lost/Missing <input type="checkbox"/><br>Part Moved <input type="checkbox"/><br>Drawing <input type="checkbox"/><br>Finish <input type="checkbox"/><br>Misread <input type="checkbox"/><br>Turning Sequence <input type="checkbox"/> |
| OTHER : <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                   |

# Picklist Print

Wednesday, September 23, 2015 10:25:30 AM

Page 1

Work Order ID: 137014

**\*137014\***

Parent Item: D407-667-205TRN

**\*D407-667-205TRN\***

Parent Item Name: Crosstube Turning Detail

Start Date: 9/23/2015

Required Date: 9/23/2015

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec  
IPP Rev B 08.04.02 Removed polish EC verified by: DD  
IPP Rev:C 08-08-19 revE as per dwg DD verified by:EC

| Component Item ID/<br>Item Name | Replacement<br>Item ID | Mfg/<br>Purch | Bin<br>Item | Primary<br>Location | Last<br>Location | Route<br>Seq ID | Unit of<br>Measure | Qty on<br>Hand | Qty per Kit | Total<br>Qty | Qty<br>Issued | Date<br>Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D6011-115                       |                        | Manufactured  | No          |                     |                  | 120             | Each               | 46.0000        | 1           | 1            |               |                |        |

**\*D6011-115\***

**\*\***

Crosstube Material

Location

Loc Qty

Loc Code

LG003

46

107880

22

123976

19

75639

5

1 mar 16/01/20



DQA: \_\_\_\_\_ Date: \_\_\_\_\_



## WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

Work Order update only ☐

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| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                            | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Suspected Unapproved <input type="checkbox"/> |                                               | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width:100%; border: none;"> <tr> <td style="width:15%;">Skid-tube <input type="checkbox"/></td> <td style="width:15%;">Cross tube <input type="checkbox"/></td> <td style="width:15%;">Water Jet <input type="checkbox"/></td> <td style="width:15%;">Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> |                                   |                                   |                                                                                                                                                     |                                        |                                   | Skid-tube <input type="checkbox"/>    | Cross tube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/>     | Machining <input type="checkbox"/>          | Small Fab <input type="checkbox"/>        | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/>           | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/>               | Large Fab <input type="checkbox"/>        | Composite <input type="checkbox"/>             | Supplier <input type="checkbox"/>      |                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |  |                                          |                                           |                                           |                                           |                                  |                                 |                                        |                                             |                                                |                                    |                                |                                               |                                 |                                               |                               |                                         |                                                 |                                                            |                                             |                                            |                                |                                        |                                          |                                     |                                   |                                      |                                  |                                  |                                     |                                        |                                     |                                 |                                             |                                                          |                                       |                                  |                                        |                                      |                                                |                                           |
| Skid-tube <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| Machining <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Small Fab <input type="checkbox"/>                         | Prod. 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Coord. <input type="checkbox"/>                                                                                                                                         | Quality <input type="checkbox"/>              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| Thermoforming <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| Large Fab <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| <b>Root Cause</b><br><br><table style="width:100%; border: none;"> <tr> <td style="width:15%;">Environment <input type="checkbox"/></td> <td style="width:15%;">No Re-verification <input type="checkbox"/></td> </tr> <tr> <td>Design <input type="checkbox"/></td> <td>Operator <input type="checkbox"/></td> </tr> <tr> <td>Doc/Data <input type="checkbox"/></td> <td>Offset/Setup <input type="checkbox"/></td> </tr> <tr> <td>Equip/Tooling <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> </tr> <tr> <td>Handling/Pre <input type="checkbox"/></td> <td>Training <input type="checkbox"/></td> </tr> <tr> <td>Material <input type="checkbox"/></td> <td>Use for Testing <input type="checkbox"/></td> </tr> <tr> <td>Internal Transport <input type="checkbox"/></td> <td>Poor Information <input type="checkbox"/></td> </tr> <tr> <td>Tribal Knowledge <input type="checkbox"/></td> <td>Rushing <input type="checkbox"/></td> </tr> <tr> <td>LOA <input type="checkbox"/></td> <td>Product Improvement <input type="checkbox"/></td> </tr> <tr> <td>Substation <input type="checkbox"/></td> <td>Process Improvement <input type="checkbox"/></td> </tr> <tr> <td>Past Expiry Date <input type="checkbox"/></td> <td>Manufacturing Process <input type="checkbox"/></td> </tr> <tr> <td>Misidentified <input type="checkbox"/></td> <td>Past Due <input type="checkbox"/></td> </tr> </table> |                                                            | Environment <input type="checkbox"/>                                                                                                                                               | No Re-verification <input type="checkbox"/>   | Design <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Operator <input type="checkbox"/> | Doc/Data <input type="checkbox"/> | Offset/Setup <input type="checkbox"/>                                                                                                               | Equip/Tooling <input type="checkbox"/> | Supplier <input type="checkbox"/> | Handling/Pre <input type="checkbox"/> | Training <input type="checkbox"/>   | Material <input type="checkbox"/>  | Use for Testing <input type="checkbox"/> | Internal Transport <input type="checkbox"/> | Poor Information <input type="checkbox"/> | Tribal Knowledge <input type="checkbox"/>  | Rushing <input type="checkbox"/> | LOA <input type="checkbox"/>           | Product Improvement <input type="checkbox"/> | Substation <input type="checkbox"/>          | Process Improvement <input type="checkbox"/> | Past Expiry Date <input type="checkbox"/> | Manufacturing Process <input type="checkbox"/> | Misidentified <input type="checkbox"/> | Past Due <input type="checkbox"/> | <b>FAULT CATEGORY</b><br><br><table style="width:100%; border: none;"> <tr> <td style="width:15%;">Pressure/Forced <input type="checkbox"/></td> <td style="width:15%;">Temperature/Cure <input type="checkbox"/></td> <td style="width:15%;">Power Loss/Surge <input type="checkbox"/></td> <td style="width:15%;">Positioned Wrong <input type="checkbox"/></td> </tr> <tr> <td>Bending <input type="checkbox"/></td> <td>Set-up <input type="checkbox"/></td> <td>Folio/Program <input type="checkbox"/></td> <td>Outside Dimensions <input type="checkbox"/></td> </tr> <tr> <td>Centre Not Concentric <input type="checkbox"/></td> <td>BOM/Route <input type="checkbox"/></td> <td>Grain <input type="checkbox"/></td> <td>Over/Under tolerance <input type="checkbox"/></td> </tr> <tr> <td>Cracks <input type="checkbox"/></td> <td>Broken/Damage/Defect <input type="checkbox"/></td> <td>Weld <input type="checkbox"/></td> <td>Part Incorrect <input type="checkbox"/></td> </tr> <tr> <td>Crimp/Kink/Ripple/Wave <input type="checkbox"/></td> <td>Inspection Incomplete/Unqualified <input type="checkbox"/></td> <td>Wrong Stock Pulled <input type="checkbox"/></td> <td>Part Lost/Missing <input type="checkbox"/></td> </tr> <tr> <td>Cuffs <input type="checkbox"/></td> <td>Contamination <input type="checkbox"/></td> <td>Out of Sequence <input type="checkbox"/></td> <td>Part Moved <input type="checkbox"/></td> </tr> <tr> <td>Crushing <input type="checkbox"/></td> <td>Countersink <input type="checkbox"/></td> <td>Off-set <input type="checkbox"/></td> <td>Drawing <input type="checkbox"/></td> </tr> <tr> <td>Heat Treat <input type="checkbox"/></td> <td>Cut Too Short <input type="checkbox"/></td> <td>Mislabeled <input type="checkbox"/></td> <td>Finish <input type="checkbox"/></td> </tr> <tr> <td>Wave/Twist in Tube <input type="checkbox"/></td> <td>Instructions Incomplete/Unclear <input type="checkbox"/></td> <td>Fit/Function <input type="checkbox"/></td> <td>Misread <input type="checkbox"/></td> </tr> <tr> <td>Marks/Chatter <input type="checkbox"/></td> <td>Drill Holes <input type="checkbox"/></td> <td>Misaligned/off center <input type="checkbox"/></td> <td>Turning Sequence <input type="checkbox"/></td> </tr> </table> |  |  |  |  |  | Pressure/Forced <input type="checkbox"/> | Temperature/Cure <input type="checkbox"/> | Power Loss/Surge <input type="checkbox"/> | Positioned Wrong <input type="checkbox"/> | Bending <input type="checkbox"/> | Set-up <input type="checkbox"/> | Folio/Program <input type="checkbox"/> | Outside Dimensions <input type="checkbox"/> | Centre Not Concentric <input type="checkbox"/> | BOM/Route <input type="checkbox"/> | Grain <input type="checkbox"/> | Over/Under tolerance <input type="checkbox"/> | Cracks <input type="checkbox"/> | Broken/Damage/Defect <input type="checkbox"/> | Weld <input type="checkbox"/> | Part Incorrect <input type="checkbox"/> | Crimp/Kink/Ripple/Wave <input type="checkbox"/> | Inspection Incomplete/Unqualified <input type="checkbox"/> | Wrong Stock Pulled <input type="checkbox"/> | Part Lost/Missing <input type="checkbox"/> | Cuffs <input type="checkbox"/> | Contamination <input type="checkbox"/> | Out of Sequence <input type="checkbox"/> | Part Moved <input type="checkbox"/> | Crushing <input type="checkbox"/> | Countersink <input type="checkbox"/> | Off-set <input type="checkbox"/> | Drawing <input type="checkbox"/> | Heat Treat <input type="checkbox"/> | Cut Too Short <input type="checkbox"/> | Mislabeled <input type="checkbox"/> | Finish <input type="checkbox"/> | Wave/Twist in Tube <input type="checkbox"/> | Instructions Incomplete/Unclear <input type="checkbox"/> | Fit/Function <input type="checkbox"/> | Misread <input type="checkbox"/> | Marks/Chatter <input type="checkbox"/> | Drill Holes <input type="checkbox"/> | Misaligned/off center <input type="checkbox"/> | Turning Sequence <input type="checkbox"/> |
| Environment <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| Design <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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| Doc/Data <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| Equip/Tooling <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| Handling/Pre <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| Material <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| Internal Transport <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| Tribal Knowledge <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| LOA <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| Substation <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| Past Expiry Date <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| Misidentified <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| Pressure/Forced <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| Bending <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| Centre Not Concentric <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | BOM/Route <input type="checkbox"/>                         | Grain <input type="checkbox"/>                                                                                                                                                     | Over/Under tolerance <input type="checkbox"/> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                                   |                                                                                                                                                     |                                        |                                   |                                       |                                     |                                    |               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   |                                     |                                 |                                             |                                                          |                                       |                                  |                                        |                                      |                                                |                                           |
| Cracks <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Broken/Damage/Defect <input type="checkbox"/>              | Weld <input type="checkbox"/>                                                                                                                                                      | Part Incorrect <input type="checkbox"/>       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                                   |                                                                                                                                                     |                                        |                                   |                                       |                                     |                                    |               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   |                                     |                                 |                                             |                                                          |                                       |                                  |                                        |                                      |                                                |                                           |
| Crimp/Kink/Ripple/Wave <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Inspection Incomplete/Unqualified <input type="checkbox"/> | Wrong Stock Pulled <input type="checkbox"/>                                                                                                                                        | Part Lost/Missing <input type="checkbox"/>    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                                   |                                                                                                                                                     |                                        |                                   |                                       |                                     |                                    |               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   |                                     |                                 |                                             |                                                          |                                       |                                  |                                        |                                      |                                                |                                           |
| Cuffs <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Contamination <input type="checkbox"/>                     | Out of Sequence <input type="checkbox"/>                                                                                                                                           | Part Moved <input type="checkbox"/>           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                                   |                                                                                                                                                     |                                        |                                   |                                       |                                     |                                    |               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   |                                     |                                 |                                             |                                                          |                                       |                                  |                                        |                                      |                                                |                                           |
| Crushing <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Countersink <input type="checkbox"/>                       | Off-set <input type="checkbox"/>                                                                                                                                                   | Drawing <input type="checkbox"/>              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                                   |                                                                                                                                                     |                                        |                                   |                                       |                                     |                                    |               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   |                                     |                                 |                                             |                                                          |                                       |                                  |                                        |                                      |                                                |                                           |
| Heat Treat <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Cut Too Short <input type="checkbox"/>                     | Mislabeled <input type="checkbox"/>                                                                                                                                                | Finish <input type="checkbox"/>               |                                                                                                                                                                                                                                                                                                                                          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   |                                     |                                 |                                             |                                                          |                                       |                                  |                                        |                                      |                                                |                                           |
| Wave/Twist in Tube <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Instructions Incomplete/Unclear <input type="checkbox"/>   | Fit/Function <input type="checkbox"/>                                                                                                                                              | Misread <input type="checkbox"/>              |                                                                                                                                                                                                                                                                                                                                          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   |                                     |                                 |                                             |                                                          |                                       |                                  |                                        |                                      |                                                |                                           |
| Marks/Chatter <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Drill Holes <input type="checkbox"/>                       | Misaligned/off center <input type="checkbox"/>                                                                                                                                     | Turning Sequence <input type="checkbox"/>     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |                                   |                                                                                                                                                     |                                        |                                   |                                       |                                     |                                    |               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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                            | OTHER : <input type="checkbox"/>                                                                                                                                                   |                                               |                                                                                                                                                                                                                                                                                                                                          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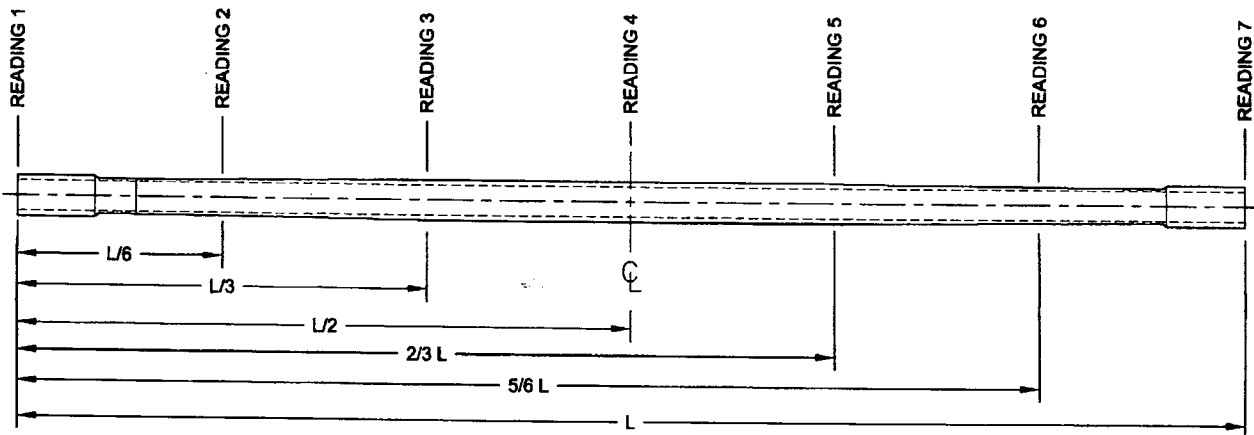
|                                            |  |                                  |
|--------------------------------------------|--|----------------------------------|
| <b>DART AEROSPACE LTD</b>                  |  | <b>Work Order:</b> 137014        |
| <b>Description:</b> Crosstube Assembly     |  | <b>Part Number:</b> D407-667-245 |
| <b>Inspection Dwg:</b> D407-667-245 Rev: G |  | <b>Page 1 of 2</b>               |

### FIRST ARTICLE INSPECTION CHECKLIST

| Inspection Sheet<br>Drawing Dimension | Tolerance | Actual<br>Dimension | Accept | Reject | Method of<br>Inspection | Comments |
|---------------------------------------|-----------|---------------------|--------|--------|-------------------------|----------|
| SIDE A                                | 2.490     | +0.005/-0.000       | 2.494  | /      |                         | vern     |
|                                       | 1.832     | +0.005/-0.000       | 1.835  | /      |                         | CNC-08   |
|                                       | 1.838     | +0.005/-0.000       | 1.848  | /      |                         |          |
|                                       | 1.892     | +0.005/-0.000       | 1.897  | /      |                         |          |
|                                       | 2.052     | +0.005/-0.000       | 2.057  | /      |                         |          |
|                                       | 2.206     | +0.005/-0.000       | 2.210  | /      |                         |          |
|                                       | 2.521     | +0.005/-0.000       | 2.524  | /      |                         |          |
|                                       | 2.633     | +0.005/-0.000       | 2.637  | /      |                         |          |
|                                       | 4.10      | +/-0.030            | 4.10   | /      |                         | vern     |
|                                       | 4.978     | +/-0.030            | 4.980  | /      |                         | CNC-08   |
|                                       | 2.040     | +0.000/-0.010       | 2.036  | /      |                         |          |
|                                       | 0.125     | +/-0.010            | .125   | /      |                         |          |
|                                       | R0.063    | +/-0.010            | .063   | /      |                         | RG       |
|                                       | R0.500    | +/-0.010            | .500   | /      |                         | "        |
|                                       | 2.490     | +0.005/-0.000       | 2.494  | /      |                         | vern     |
|                                       | 1.832     | +0.005/-0.000       | 1.832  | /      |                         | CNC-08   |
| SIDE B                                | 1.838     | +0.005/-0.000       | 1.836  | /      |                         |          |
|                                       | 1.892     | +0.005/-0.000       | 1.890  | /      |                         |          |
|                                       | 2.052     | +0.005/-0.000       | 2.051  | /      |                         |          |
|                                       | 2.206     | +0.005/-0.000       | 2.208  | /      |                         |          |
|                                       | 2.521     | +0.005/-0.000       | 2.525  | /      |                         |          |
|                                       | 2.633     | +0.005/-0.000       | 2.634  | /      |                         |          |
|                                       | 4.10      | +/-0.030            | 4.10   | /      |                         | vern     |
|                                       | 4.978     | +/-0.030            | 4.980  | /      |                         | CNC-08   |
|                                       | 2.040     | +0.000/-0.010       | 2.038  | /      |                         |          |
|                                       | 0.125     | +/-0.010            | .125   | /      |                         |          |
|                                       | R0.063    | +/-0.010            | .063   | /      |                         | RG       |
|                                       | R0.500    | +/-0.010            | .500   | /      |                         | "        |
|                                       | 112.91    | +/-0.020            | 112.91 | /      |                         | Ampe     |
|                                       |           |                     |        |        |                         | L6-11    |

|                                            |  |                                  |
|--------------------------------------------|--|----------------------------------|
| <b>DART AEROSPACE LTD</b>                  |  | <b>Work Order:</b> 137014        |
| <b>Description:</b> Crosstube Assembly     |  | <b>Part Number:</b> D407-667-245 |
| <b>Inspection Dwg:</b> D407-667-245 Rev: G |  | <b>Page 2 of 2</b>               |

### WALL THICKNESS MEASUREMENT



| Location            | WALL THICKNESS MEASUREMENT (IN) |      |      |      | Deviation<br>$\Delta w$<br>(max-min) | TOLERANCE |
|---------------------|---------------------------------|------|------|------|--------------------------------------|-----------|
|                     | w1                              | w2   | w3   | w4   |                                      |           |
| READING 1<br>L= 0"  | .233                            | .233 | .231 | .236 | .005                                 | 0.075"    |
| READING 2<br>L= 19  | .217                            | .236 | .268 | .261 | .051                                 |           |
| READING 3<br>L= 37  | .382                            | .392 | .426 | .422 | .044                                 |           |
| READING 4<br>L= 56  | .618                            | .650 | .678 | .652 | .060                                 |           |
| READING 5<br>L= 75  | .380                            | .417 | .455 | .430 | .075                                 |           |
| READING 6<br>L= 93  | <.213>                          | .264 | .295 | .258 | <.082>                               |           |
| READING 7<br>L= 112 | .233                            | .233 | .232 | .233 | .001                                 |           |

by A

0.238 0.25

#### Calibration Result

DAS  
**47**

Actual Block Thickness: .600 .780

SITESCAN 250 Measured Thickness: .100 .750

|                         |                        |                              |
|-------------------------|------------------------|------------------------------|
| <b>Measured by:</b> mmL | <b>Audited by:</b> 989 | <b>Preliminary Approval:</b> |
| <b>Date:</b> 16/02/04   | <b>Date:</b> 16-02-10  | <b>Date:</b>                 |

| Rev | Date     | Change                                | Revised by | Approved |
|-----|----------|---------------------------------------|------------|----------|
| A   | 04.04.21 | New Issue (P/O D407-667-205)          | KJ/RF      |          |
| B   | 06.03.09 | Dwg Rev updated                       | KJ/JLM     |          |
| C   | 06.03.30 | Tolerance revised for 4.978 dimension | KJ/JLM     |          |
| D   | 07.02.19 | Dwg Rev updated                       | KJ/JLM     |          |
| E   | 09.05.20 | Dwg Rev updated                       | KJ         |          |
| F   | 12.06.04 | Wall thickness form added             | KJ         |          |
| G   | 15.05.14 | Dwg Rev updated                       | KJ         |          |

| Item | QTY<br>-245 | PART NUMBER       | DESCRIPTION                       |
|------|-------------|-------------------|-----------------------------------|
|      | X           | D407-667-245      | CROSSTUBE ASSEMBLY (407 HIGH AFT) |
| 1    | 1           | D6011-115         | CROSSTUBE                         |
| 2    | 2           | D2873-043         | NUT PLATE                         |
| 3    | 2           | D2873-045         | NUT PLATE                         |
| 4    | 1           | D2894-1           | SUPPORT                           |
| 5    | 2           | D3190-1           | CHAFING SHIELD                    |
| 6    | 2           | D3595-063-430     | RUBBER CUSHION                    |
| 7    | 14          | MS20601AD4W8      | RIVET (OR NAS9302B-4-8)           |
| 8    | 4           | MS21920-22        | CLAMP                             |
| 9    | 2           | MS21920-25        | CLAMP (OR MS21920-24)             |
| 10   | AR          | SCOTCH-WELD DP460 | EPOXY ADHESIVE, 3M SCOTCH-WELD    |
| 11   | AR          | PROSEAL 890       | SEALANT                           |

# **GENERAL NOTES:**

- MATERIAL: MANUFACTURED FROM D6011-115  
FINISHED LENGTH = 112.91±0.020
- FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT CROSSTUBE PER DART QSI 005 4.2  
FOR HATCHED AREAS (ZN A6-2), MASK AS REQUIRED  
TO APPLY PRIME AND APPLY CLEAR COAT ONLY
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D407-667-245" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- WEIGHT: 27.7 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE.
- RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- INSTALL D2894-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- INSTALL MS21920-25 CLAMPS WITH D3595-063-430 RUBBER CUSHIONS TO SECURE D2894-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.  
NOTE: MS21920-24 CLAMPS CAN BE USED TO ACCOMMODATE VARYING DIAMETERS. ENSURE THERE IS A MINIMUM OF 1.5 THREADS IN SAFETY ON THE NUTS.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3190-1 CHAFING SHIELDS AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D3190-1 CHAFING SHIELDS ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- INSTALL D3190-1 CHAFING SHIELDS SO THAT OVERLAP IS 50 TO 70 DEGREES FROM BOTTOM OF CROSSTUBE OPPOSITE D2894-1 SUPPORT.
- TORQUE CLAMPS 80 TO 100 IN-LB. TORQUE CLAMPS ON D3190-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.

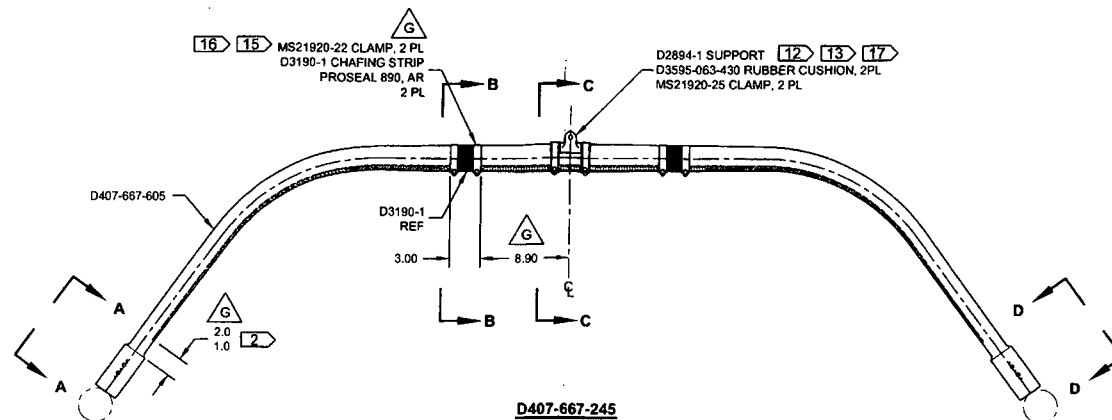
137014. MJS  
15-09-23

|            |                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                |              |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| G          | INCORP. DEO's D407-667-245-F1/F2 (ZN D8-1, A8-1, D5-2, B6-2, C6-2); 8.90 WAS 8.53 (ZN D5-2); TORQUE REDUCED FOR CHAFING SHIELD (ZN A8-1); FINISH REVISED TO ALLOW MANUFAC. FLEXIBILITY (ZN C8-1)                                   | RF                                                                                                                                                                                                                                                             | 15.03.20     |
| F          | REFORMAT NOTES TO NEW STANDARDS (ZN B8-1); RELOCATED FLAG # 6 (ZN A8-3) PER NCR 210; REMOVED REF. & ADD TOLERANCES (ZN C6-3, C4-3 & D2-3)                                                                                          | RF                                                                                                                                                                                                                                                             | 08.11.06     |
| E          | 8.02 AND 8.53 WERE 8.40 AND 8.90 (ZN D5-2); REORGANIZED VIEWS AND REFORMATED DRAWING TO CURRENT STANDARDS. REASONS: CLAMPS MOVED 0.375 TOWARD CL TO ELIMINATE INTERFERENCE WITH AIRCRAFT MOUNTS. REFERENCE: PAR#08-21 AND ECN#1225 | MB                                                                                                                                                                                                                                                             | 08.07.24     |
| D          | ADD VIEW FOR OEM SKID HOLES, ROTATE ORIENTATION OF CLAMPS SECTION F-F, REMOVE .851 ABRASION STRIP, ADD MAGNOBOND 6398, ADD CUSHION                                                                                                 | PH                                                                                                                                                                                                                                                             | 07.02.07     |
| C          | ADD HOLES AND NUT PLATES FOR COMPATIBILITY WITH BHT/AA SKIDTUBES                                                                                                                                                                   | PH                                                                                                                                                                                                                                                             | 05.07.26     |
| B          | ADD CHAFING SHIELD                                                                                                                                                                                                                 | CP                                                                                                                                                                                                                                                             | 03.05.21     |
| A          | NEW ISSUE                                                                                                                                                                                                                          | CP                                                                                                                                                                                                                                                             | 02.05.13     |
| REV.       | DESCRIPTION                                                                                                                                                                                                                        | BY                                                                                                                                                                                                                                                             | DATE         |
| DESIGN     | 9                                                                                                                                                                                                                                  | <b>DART AEROSPACE LTD</b><br>HAWKESBURY, ONTARIO, CANADA                                                                                                                                                                                                       |              |
| DRAWN      | RF                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                |              |
| CHECKED    | 9                                                                                                                                                                                                                                  | DRAWING NO.                                                                                                                                                                                                                                                    | REV. G       |
| MFG. APPR. | 9                                                                                                                                                                                                                                  | D407-667-245                                                                                                                                                                                                                                                   | SHEET 1 OF 4 |
| APPROVED   | 9                                                                                                                                                                                                                                  | TITLE                                                                                                                                                                                                                                                          | SCALE        |
| DE APPR.   | 9                                                                                                                                                                                                                                  | CROSSTUBE ASSY (407 HIGH AFT)                                                                                                                                                                                                                                  | NTS          |
| DATE       | 15.03.20                                                                                                                                                                                                                           | COPYRIGHT © 2002 BY DART AEROSPACE LTD<br>THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD. |              |

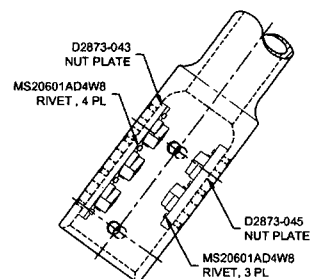
**RELEASED**

2015 APR 09

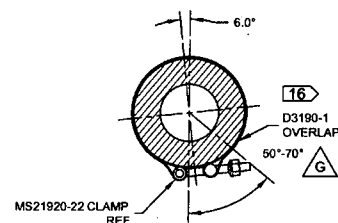
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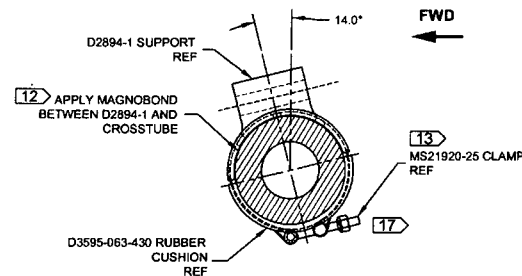
**D407-667-245  
ASSEMBLY DETAIL  
(VIEW LOOKING FWD)**



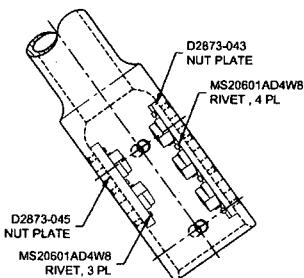
**VIEW A-A CUFF DETAIL  
SCALE 4X**



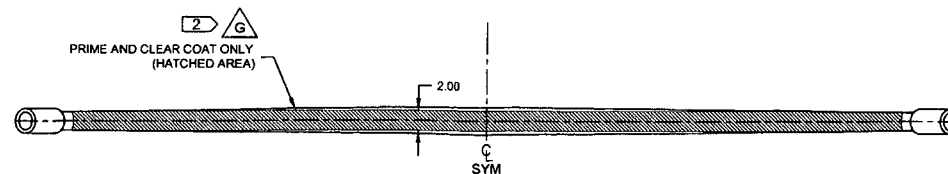
**SECTION B-B  
SCALE 4X, 2PL**



**SECTION C-C  
SCALE 4X**

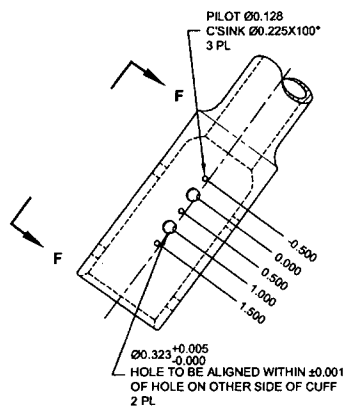


**VIEW D-D CUFF DETAIL  
SCALE 4X**

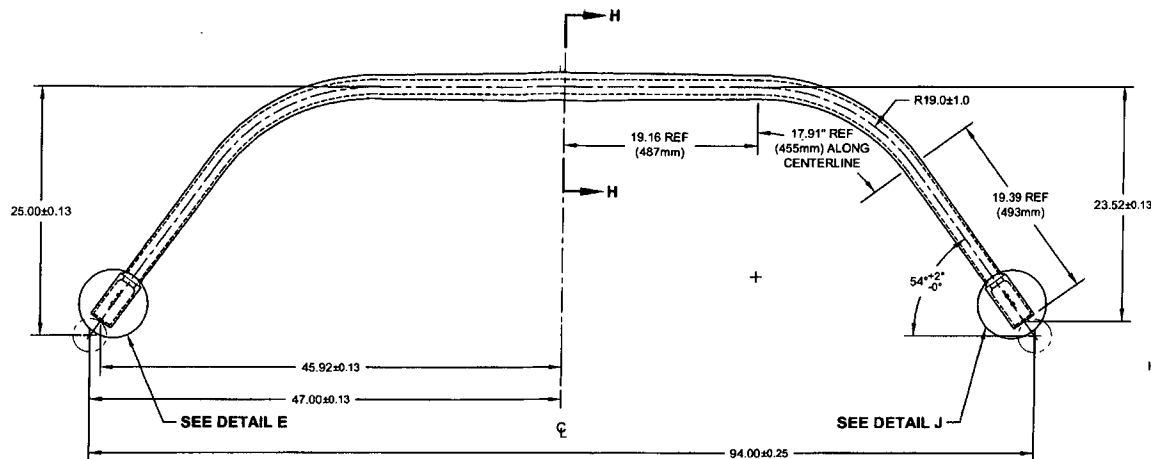


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2015 APR 09

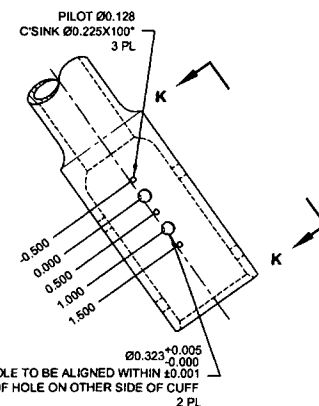
|            |          |                                                                                                                                                                                                                                                                         |              |
|------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| DESIGN     | 9P       | <b>DART AEROSPACE LTD</b>                                                                                                                                                                                                                                               |              |
| DRAWN      | RF       | HAWKESBURY, ONTARIO, CANADA                                                                                                                                                                                                                                             |              |
| CHECKED    | 9P       | DRAWING NO.                                                                                                                                                                                                                                                             | REV. G       |
| MFG. APPR. | 9P       | D407-667-245                                                                                                                                                                                                                                                            | SHEET 2 OF 4 |
| APPROVED   | 9P       | TITLE                                                                                                                                                                                                                                                                   | SCALE        |
| DE APPR.   | 9P       | CROSSTUBE ASS'Y (407 HIGH AFT)                                                                                                                                                                                                                                          | NTS          |
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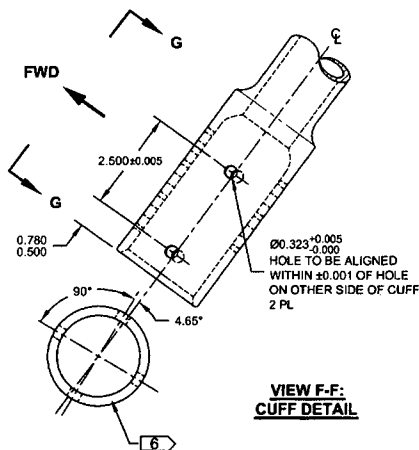
**DETAIL E**  
SCALE 4X  
(VIEW LOOKING FWD)



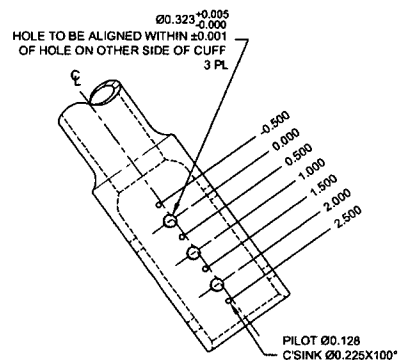
**D407-667-605**  
**BENDING AND DRILLING DETAIL**  
(VIEW LOOKING FWD)



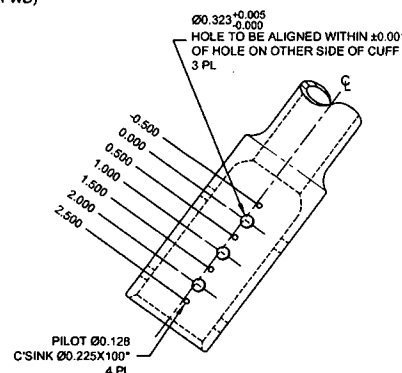
**DETAIL J**  
SCALE 4X  
(VIEW LOOKING FWD)



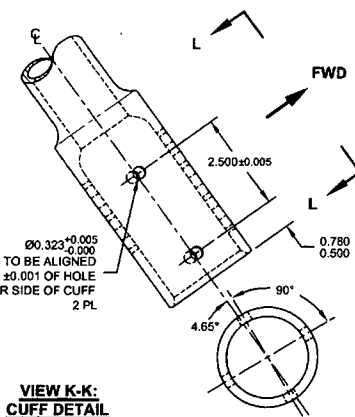
**VIEW F-F:**  
**CUFF DETAIL**



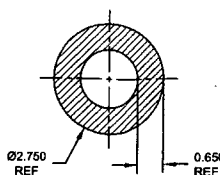
**VIEW G-G**  
(VIEW LOOKING AFT, ROTATED)



**VIEW L-L**  
(VIEW LOOKING AFT, ROTATED)



**VIEW K-K:**  
**CUFF DETAIL**



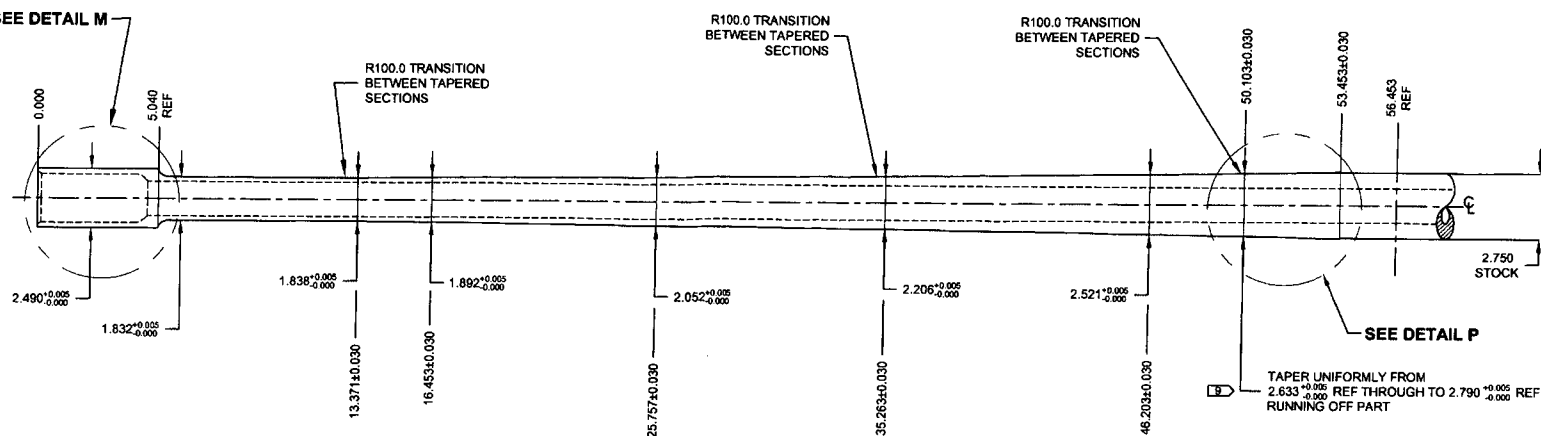
**SECTION H-H**  
SCALE 4X

**RELEASED**

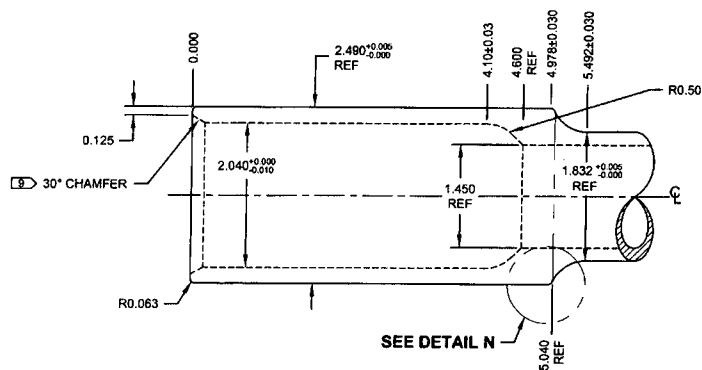
2015 APR 09

|                                                                                                                                                                                                                                |          |                                        |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------------------------|--------------|
| DESIGN                                                                                                                                                                                                                         | 97       | <b>DART AEROSPACE LTD</b>              |              |
| DRAWN                                                                                                                                                                                                                          | RF       | HAWKESBURY, ONTARIO, CANADA            |              |
| CHECKED                                                                                                                                                                                                                        | 97       | DRAWING NO.                            | REV. G       |
| MFG. APPR.                                                                                                                                                                                                                     | 97       | D407-667-245                           | SHEET 3 OF 4 |
| APPROVED                                                                                                                                                                                                                       | 97       | TITLE                                  | SCALE        |
| DE APPR.                                                                                                                                                                                                                       | 97       | CROSSTUBE ASS'Y (407 HIGH AFT)         | NTS          |
| DATE                                                                                                                                                                                                                           | 15.03.20 | COPYRIGHT © 2002 BY DART AEROSPACE LTD |              |
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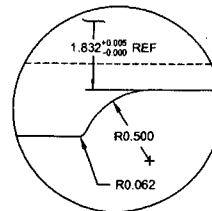
SEE DETAIL M



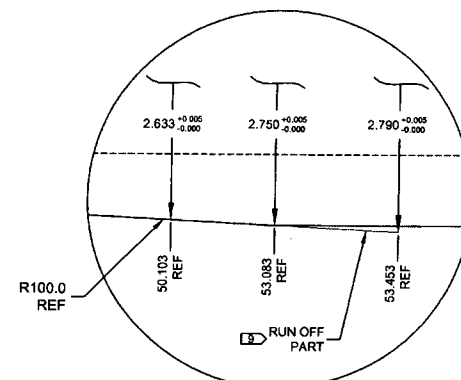
**D407-667-245 MACHINING DETAIL**



**DETAIL M: CROSSTUBE CUFF**  
SCALE 3X



**DETAIL N: CUFF TRANSITION**  
SCALE 2X



**DETAIL P: TAPER RUN-OFF**  
NOT TO SCALE

RELEASED

2015 APR 09

|            |          |                                                                                                                                                                                                                                                                                 |              |
|------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| DESIGN     | 9P       | <b>DART AEROSPACE LTD</b>                                                                                                                                                                                                                                                       |              |
| DRAWN      | RF       | HAWKESBURY, ONTARIO, CANADA                                                                                                                                                                                                                                                     |              |
| CHECKED    | 9P       | DRAWING NO.                                                                                                                                                                                                                                                                     | REV. G       |
| MFG. APPR. | 9P       | D407-667-245                                                                                                                                                                                                                                                                    | SHEET 4 OF 4 |
| APPROVED   | 9P       | TITLE                                                                                                                                                                                                                                                                           | SCALE        |
| DE APPR.   | 9P       | CROSSTUBE ASS'Y (407 HIGH AFT)                                                                                                                                                                                                                                                  | NTS          |
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